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All There is to See: Film Restoration and Access in the Digital Age

Introduction

For over 120 years, motion pictures have captivated audiences around the world. They are a unique amalgam, realistically depicting the world around us and transporting us to the world of the fantastic. Today, movies represent a thriving industry which reaches across a multitude of money-making realms: theme park rides, toys, clothing, magazines, fast-food tie-ins, soundtracks, and home video. Despite commercial context, filmmaking is an artistic endeavor, the product of creative collaboration, whether made within the more restrictive studio system or independently.

Films are made to be seen by an audience. Traditionally, this audience is a group of individuals collected together in the shared space of an auditorium where they face a large screen onto which the film is projected from behind them. The metronomic rhythm of the projector 24 times per second has come to characterize the communal experience of the movies.

Until recently, theatrical exhibition was one of only two options available to view films, neither of which gave the audience much control. Television was initially seen as a threat to Hollywood. While the films shown on TV might be years out of theatrical circulation, the convenience of popular television programs kept people from going out as often as they had in the past. Indeed, ticket sales declined in the early years of television and the movie studios sought new technology to attract the audience back to the big screen.

Immersion became the key. Theaters upgraded speaker systems to surround the audience in sound. Film stocks and cameras were developed that squeezed and distorted the image into the frame, only to be unstretched and unfurled into a new wider aspect ratio by projectors equipped with new anamorphic lenses. “[W]idescreen had evolved from a transitory fad into a permanent fixture of motion picture production and exhibition... [a]lthough other technological innovations, such as 3-D, never progressed

beyond the status of novelty items, widescreen, like sound and color, transformed the face of the cinema” (Belton 12) and a variety of studio-specific formats littered the market, each a slight variation of the other, including: CinemaScope, VistaVision, Cinerama, and Todd-AO. “By the end of the decade [the 1950s], widescreen had evolved from a transitory fad into a permanent fixture of motion picture production and exhibition...” (Belton 12)

Unable to replicate the widescreen format on television screens, broadcasters resorted to conforming and reformatting the image frame. Despite the loss of immersion due to smaller image area and the overall loss in image quality, consumers grew comfortable with watching movies at home. Many people grew up watching films broadcast on television, though the theatrical experience had to be modified to accommodate the technological limitations of early televisions screens: square frame, black & white, low scan line resolution, adding of commercial breaks, editing for content and time restraints. This home viewing experience remains a much more casual alternative to going out “to the movies”.

A new industry soon sprung up to fill the desire to relive films at one’s own convenience. Beginning in the early 1970s, interest in home video skyrocketed and resulted in what is now an “\$18 billion” industry (Orden). A variety of formats were developed to provide consumers with the means to view films in the comfort of home. With each subsequent advance in technology, with improvements to television screens leading the innovation, the line separating the silver screen from the “tube” has blurred.

Lost in all of this change are the content creators: the artists. There is a need to balance authorial intent with technological limitations. Yet today, more than ever, the limitations lay less with the technology than with the studios that control the vast catalogues of films. The consumer is the economic incentive in studio efforts to populate the home video market with their catalog titles. The effort needed to make high quality masters of films for this purpose is paramount, though it is but one aspect in a much larger ongoing battle: the preservation and restoration of our cinema heritage.

The following is a look at the state of cinema on home video, the efforts that go into presenting catalog titles to the consumer and how they are closely related to the broader need to ensure that our cinematic legacy remains available to future generations. Emphasis is placed on the major eras of film history, the unique challenges they pose to studios and archives in charge of their safekeeping, and the technological advances that have risen to meet them.

The State of Cinema

Digital filmmaking has ushered in a democratization of creativity, allowing independent filmmakers the ability to achieve a quality of image that would previously have required cost-prohibitive equipment. Advantages lay beyond the production side of filmmaking too, with post-production jobs such as editing, color correction, special effects, etc. all benefiting from the speed and organization of a digital workflow.

The big Hollywood studios quickly adopted digital technology, and consumers have been on the receiving end of a massive overhaul of distribution, including how movies are consumed. Since 2002, 35mm projectors have been slowly phased out of theaters. Today, instead of a film print being threaded through a projector and lit onto a screen, an encrypted hard drive is sent from the studio that is ingested into a computer terminal that is attached to a digital projector.

For moviegoers, the change is an improvement to the dim, scratchy, flickering, wobbly pictures that were often projected onto their screens. Digital distribution ensures consistency. There is no wear to the information stored on the hard drives; the 1000th time projected will look identical to the first. Big, bright, crystal clarity are now synonymous with the theatrical experience.

Theatrical exhibition is not the only front which has seen a shift for audiences in the last decade. The business model for home video has also reacted to the mobile technology and connectivity that has become commonplace. “. . .the ultimate measure of media communications and the services they offer is how subscribers perceive the

performance and especially the quality of the media, in technical terms denoted the Quality of Experience (QoE). QoE is typically the term used to describe the perception and how usable or good the subscribers think the media or services are” (Perkis). With an emphasis placed on convenience, movies are today consumed in ways that simply did not exist ten years ago.

The Classic Finds its Audience

Films have a lingering effect on our psyche and are an important part of popular culture. Long after its theatrical lifespan has passed, a film will continue to be made available to audiences on various physical media formats available for purchase and now on-demand via online streaming. This breadth of supply has made it easier than ever to watch films beyond the main shelves of a video store, whether catching up on classics or discovering a lost gem.

The availability of older films on home video and online often comes down to the existence of high quality video masters. After a film’s theatrical run, the 35mm print and many ancillary picture elements (including the original camera negative (OCN), dailies, sound elements, special effect shots, matte paintings, etc.) are put into long-term storage by the film studio or archived in climate-controlled vaults. The careful attention to storage conditions helps ensure the longevity of the elements. When properly stored, 35mm film has the potential to last upwards of 100 years and quite possibly longer.

When the prospect of a home video release is entertained, these 35mm picture elements must be scanned by a machine called a telecine and converted into video information. Modern telecines are digital and act much like a home desktop scanner. The film is threaded into the machine like it would be into a projector and each frame is scanned by a powerful sensor. These frames are delivered to a computer which then stitches them together into a new digital copy.

This copy, or master, will now be the basis for all future releases of that film. The importance of creating a master that is as detailed as possible has implications

further down the pipeline. Today, it is common for telecines to scan film at resolutions far superior to anything available to consumers. This is done as a means of *futureproofing* the master, anticipating the needs of home audiences 5-10 years ahead so the need to revisit the precious original picture elements is limited as much as possible. The work of translating the physical film format into digital is the key to expanding cinema availability.

Early Cinema (1910s-1920s)

In examining the state of cinema available to consumers today, it is important to start with some of the earliest entries. These films are essential for their place in history, yet they are relatively rare on home video. The age of any potential film elements severely restricts availability. Many films simply no longer exist. A wide-ranging study of the status of America's silent film heritage commissioned and sponsored by the National Film Preservation Board of the Library of Congress and conducted by David Pierce entitled "The Survival of American Silent Feature Films: 1912-1929" found that only 14% of the feature films produced in the United States during this period survive completely intact.

Until 1951, film stock used nitrocellulose (nitrate) as a base, which proved extremely flammable. Modern film stocks use acetate or polyester to combat this problem. Several major fires razed the collections of studios and private individuals. "The most tragic of all American nitrate film fires... occurred on July 9, 1937, in a storage building rented by the Fox Film Corporation in Little Ferry, New Jersey. Flames from the blast shot over 100 feet in the air... [and] destroyed 42 individual vaults, in which the majority of silent films produced by Fox were stored" (Slide 13).

Accidents on this scale are relatively rare. The damage they do, however, is irrevocable. The unstable nitrate film stock used during these early years wasn't the only problem. Interest in preserving films didn't factor into the business-oriented concerns of producers and directors. Materials were expensive and filmmakers used any means

available to save money and stay ahead of competitors. Films would often be recycled, melted down and used to make new negative stock for more films. Fear of piracy also contributed to the destruction of many prints that might otherwise exist today. Producers would rather not have any copies of older titles in circulation than have them get into the hands of someone that might screen them for a profit somewhere else.

Despite the meager survival rate of these films, many still exist thanks in part to a healthy international export market. Films that originated in one country often survive today only in the archives of another. Occasionally, different versions of a film may exist in different archives around the world, the result of manipulation with the intent to either censor or shorten the length of a long film. Many silent films exist today as incomplete for this very reason.

Let's first look at D.W. Griffith's 1916 epic *Intolerance* as an example of a film from this era brought to home video and the many incarnations it has seen. Because of its age, *Intolerance*'s rights have lapsed into the public domain. This situation tends to be a death sentence for any chance of a quality home video release. With no rights holder to license high quality film elements, home video companies can produce a DVD cheaply by using video masters of unknown or questionable origin sourced from similarly rough film prints, often many generations removed from the OCN.

Rescuing films from the public domain becomes a challenging endeavor for a company committed to quality. In the case of *Intolerance*, at least four different versions of the film exist. These versions are the result of differing extant elements in varying degrees of completeness and quality [Fig. 1]. Alternate takes of scenes further complicate the process, as deciding which one most closely represents the filmmaker's original intent requires a large scale project of archival investigation, tracking down documentation that may exist in disparate locations or whose location is unknown. Collaboration between archives, laboratories, scholars, collectors and studios is necessary to piece together the puzzle that is a proper restoration.

The versions of *Intolerance* that exist today exemplify this confusion, but it is not solely the content of the print that distinguishes them. Each version has at one time or another been licensed for some kind of broadcast or distribution, whether on television or released on VHS, DVD and Blu-Ray. Each of these releases further adds to the confusion. Distinctions can be made between each release because of differences in format quality, version of score, region coding, frame rate, encoding techniques, mastering competency, all of which have less to do with the film itself and more with the specific edition including supplementary material, menu design, box artwork, etc.

As of this writing, the best overall version of *Intolerance* on home video is the Blu-Ray release from the Cohen Media Group, released in November 2013. Previous incarnations include VHS releases from Republic Pictures in 1991 and Kino Video in 2000 and DVD releases from Image Entertainment in 1999 and Kino International in 2002. These editions are sourced from different extant prints, with different runtimes that when compared side by side, reveal alternate versions of takes. There may very well never be a truly “definitive” edition of *Intolerance* released as D.W. Griffith intended, but until a comprehensive effort is made to gather all disparate elements, investigate the chronology of all edits and dig through archives full of paperwork and documentation, this is the best we have.

In the more than ten years that have elapsed since the last major U.S. release of *Intolerance*, major advances have taken place in the areas of image acquisition, restoration and encoding/authoring. High-definition telecines are able to extract more detail from picture elements during scanning. The film may be scanned at resolutions of 2K or 4K so the fine texture and grain structure can be resolved. High resolution scanning also benefits the digital cleanup and repair process.

Detail is also brought out of damage marks like dust, scratches, mold, tears, etc. Finely resolved damage and debris give the restorer more control. The most common method of cleaning and repairing film involves taking data from previous frames to fill in missing data in a damaged one. Some of this can be done via automated software, for

very small speckles of dust, though most of the worst damage is still handled by a technician, and either way is always carefully quality controlled.

Finally, HD media formats allow for extremely efficient encoding that minimizes digital artifacts while maintaining the high resolution of the restored image. The end result is a version of the film that replicates its condition on its original screening as much as possible. The goal for any restoration is to balance the ability to improve the film's condition with the need to maintain the original "look." As we will see, the task becomes murkier with the addition of film's next technological advance: color.

Golden Age (1930s-1960s)

Experiments in color were nothing new by the 1930s. Innovations as far back as 1899 were developing different means to recreate the nuanced range of colors we see around us. From the mid-1910s to the late 1920s, numerous color film processes competed to improve upon each other; Technicolor was one such company. Walt Disney's *Silly Symphonies*' short *Flowers and Trees* (1932) was the first film released commercially to use Technicolor's newest advancement: three-strip Technicolor.

Developed in conjunction with a camera that facilitated the exposure of different colored light to separate strips of film, the three-strip process made dramatic strides in life-like color reproduction. In order to achieve this technological advance, the already bulky camera had to be engineered to carry three strips of black-and-white negative film. Light entering the camera was split by filters and separately directed to each film strip. One strip of film recorded the cyan color information, the second recorded the magenta, and finally the third received the yellow. The strips were then combined during the development process to produce a color print which contained all the information stored in each of the original strips.

The "look" created by the Technicolor process with heavily saturated colors particularly emphasizing red tone has become a distinguishing characteristic of early color cinema. A byproduct of the three-strip system, the warm glow in films like *The*

Adventures of Robin Hood (Curtiz/Keighley, 1938), *The Wizard of Oz* (Fleming, 1939), *Rope* (Hitchcock, 1948), and *Gentlemen Prefer Blondes* (Hawkes, 1953), is on occasion being *corrected* by restoration efforts. The advance in technology that has facilitated highly accurate scanning and debris removal within a high resolution workflow can sometimes lead to the ethical and aesthetic problem of accurately representing the original look of a film.

For Technicolor films on home video, there is a legitimate question regarding the proper source elements that should be used to create a high quality video master. The sources for most DVD releases of Technicolor films are 35mm interpositives (IPs); the three-strip negatives were aligned and processed decades earlier. In using this element, a high resolution digital master can be made that faithfully retains the original look of slightly soft, heavy color saturation. In cases where the original three-strip negatives survive (which is certainly not always the case), several recent restorations have gone back to these source elements, the earliest generation materials.

The Red Shoes (Powell/Pressburger, 1948) and *The Life and Death of Colonel Blimp* (Powell/Pressburger, 1943) both represent examples of this more revisionist approach to restoration. The Film Foundation, an organization founded by Martin Scorsese for the purpose of restoring and preserving cinema history, helmed the restoration of these two films along with the BFI and Janus Films, with the work being done by the UCLA Film & Television Archive [Fig. 2].

For quality reasons, we chose the original negative as our starting point, even though they were afflicted with a daunting number of problems: 65 percent of the film had bad color fringing, caused by differential shrinkage and sometimes by misadjustment of the camera during shooting; 176 shots contained color flickering, mottling, and 'breathing' because of uneven development and chemical staining; 70 sequences contained harsh optical effects with excessive contrast; and throughout there were thousands of visible red, blue, and green specks caused by embedded dirt and scratches. Worst of all, mold had attacked every reel and begun to eat away the emulsion, leaving behind thousands of tiny

cracks and fissures... 579,000 individual frames [were scanned] directly from the three-strip camera negatives, reregistering the colors, removing visible specks and scratches, mitigating color breathing, solving contrast issues, performing shot-to-shot color correction, and, finally, recording all 134 minutes back to 35mm Eastman color internegative stock. 4K resolution was employed at every stage of the digital picture restoration work.

-Robert Gitt, Preservation Officer, UCLA Film & Television Archive on
The Red Shoes

Digital realignment of the three-strip negative achieves a color accuracy not available to lab technicians originally working on the film in 1948. Gone is the intense saturation, replaced by a technically more tonally balanced palate. Cooler color grading is not the hallmark of an accurate Technicolor image, in fact it runs counter to the image shared in our collective memory. No one present during the film's original theatrical run would have seen a film that looked anything like the restoration, yet it nonetheless represents a more accurate rendering of the available color information stored in the negatives. Varied responses to which interpretation of a film should be seen today come from different studios, archives and restoration facilities.

A combination of original element availability, the film's prestige, and the amount of money that gets funneled to the project ultimately determine the outcome. High profile films like *Gone with the Wind* (Victor Fleming, 1939) and *The Wizard of Oz* (Victor Fleming, 1939) are "remastered" twice a decade, though often these are merely marketing gimmicks designed to entice home video consumers to purchase a film they already own to acquire some minor feature included in the new edition. High-profile studio restorations, like the two mentioned above from Warner Bros., generally seek a lighter touch in modifying the look that exists in audience memory.

Other digital restorations like those conducted by the Cineteca di Bologna via L'Immagine Ritrovata, or the French film studio Gaumont, while technically strong and visually striking, are more apt to depart from matching IP color density, though not as

severely as other less experienced facilities. The reasons for this are difficult to pinpoint. A likely scenario is that these different approaches stem merely from the differing tastes of various technicians around the world. Gaumont, for example, has taken a heavy-handed approach to much of its catalog: *French Cancan* (Jean Renoir, 1954), *Elena et les hommes* [*Elena and her Men*] (Jean Renoir, 1956) [Fig. 3], *Les amants de Montparnasse* (Jacques Becker, 1958), *Danton* (Andrzej Wajda, 1983), *Bande à part* (Jean-Luc Godard, 1964) all exhibit signs of excessive grain removal to smooth out texture, revisionist color timing to ramp up contrast and saturation, or both. Revisionism is a dangerous road to tread and is avoided at all costs by archives, yet in bringing these titles to audiences again on home video, matching the image that would have originally been seen is either not always possible or an afterthought.

When a Technicolor film is brought to home video, digital realignment is not just a byproduct of the workflow; it is often a necessity. As the negatives age, a process sped up by poor storage conditions, the celluloid base will warp and shrink. Creation of new clean interpositives is impossible, as the three-strip negative no longer aligns properly. This shrinkage causes bleeding of colors so that edges seem to have a colored halo around them. Digital tools can map the warping pattern as it progresses through the reel and correct it, locking the color channels together, allowing for the newly restored digital files to be laser printed back onto 35mm preservation negative along with new three-strip color separation film and HD digital masters to be created for theatrical and home video release.

New American Cinema (1970s-1980s)

Film stocks continued to improve into the 1970s thanks to technological advances in light sensitivity, grain structure and color management. Alongside these developments came a new wave of directors, the first graduates of film schools, with a firm grasp of cinema history and a more European storytelling sensibility. Names like Francis Ford Coppola and Martin Scorsese soon became synonymous with a gritty maturity in cinema,

a general tendency towards increasingly casual depictions of sex and violence, and a heightened political consciousness.

1972 saw the release of Coppola's *The Godfather*, the screenplay co-written by Coppola and Mario Puzo, the author of the book on which the film is based. The highest-grossing film of the year, it went on to win both the Golden Globe and Academy Award for Best Picture that year. Countless prints were created and sent to theaters across the country, even long after the initial theatrical run had ended. *The Godfather*'s popularity helped elevate the film to mythical status, but had a disastrous effect on the condition of its original elements. The problems of high demand for prints on films of this era, including *The Exorcist* (William Friedkin, 1973), *Jaws* (Steven Spielberg, 1975) and *Star Wars* (George Lucas, 1977), has caught up to the studios who own the elements in the last few decades.

Upon examination of the OCN of *Star Wars* (1977) in preparation for a 20th anniversary special edition remastering and re-release in 1997, George Lucas was shocked to find its deteriorating condition [Fig. 5]. Fading was causing the image to shift dramatically to the blue/green range, the result of "yellow layer failure," a term coined by famed film restoration expert Robert A. Harris. As he explains:

In late 1954 or early 1955, there were seemingly insignificant changes made to either the emulsions or processing. But whatever these changes were, they made the resultant exposed and processed film much more prone to fade. And things continued to get worse. 1956-58 seemed almost to be an intermediate period. Films shot during these years can have major fade problems in thinner scenes (night scenes, for example) in which there is literally less emulsion on the film after processing. *Vertigo* was one of these films. While dark scenes were no longer printable from the original negative, many fully exposed scenes could be reasonably well color corrected. And then we have the worst years for color. ... 1959 and 1960: If you have a favorite film from this period, and separation masters were not produced at the time of production, or if those sep masters were not made to specifications... your film may well be gone. *North by Northwest* is a

film in this category. *Spartacus* and *The Alamo* are others. *Can-Can*, *Porgy and Bess*, *Exodus*, *The Nun's Story* and hundreds of others... (Harris).

Not yet twenty years had passed since *Star Wars* was shot, yet the film stock could not hold up to the longevity of much older films.

Cases like *Star Wars* are all too common when negatives are revisited from color films of the 1960s and 1970s. Modern film stock is not inherently less stable, but improper storage conditions early on helped speed the fading process and the constant creation of new prints from the negative to replace the ones worn out from constant screenings introduced more image instability in the form of scratches, warping, tears, etc. “The success of the picture was such that made many many many more prints than anyone expected, and the irony was that it was distressed and the negative was destroyed” (Emulsional Rescue, Coppola). *The Godfather* (1972) had met the same fate when Paramount initiated a comprehensive restoration in the mid-2000s. The project was led by Harris, and immediately *The Godfather* proved challenging due to the unique lighting and exposure used during filming by DP Gordon Willis.

The Godfather is steeped in rich sepia tones overall, with a dynamic range that ventures to the extreme of what the Kodak 5254 negative stock is capable of resolving. This feat of cinematography was done with the expressed purpose of making it impossible for a third party to improperly develop the film. “What Gordon did was to create a negative that no one could mess with. There’s nothing in the blacks, there is no exposure in the negative in the blacks. There is only one way to print *The Godfather*, and that is, dark” (Emulsional Rescue, Harris). Whites are nearly blown out during the outdoor wedding scene at the beginning of the film, and blacks are so rich and murky that any slight fluctuation in exposure would render the shadowy scenes “perfectly” lit. Many prints in circulation tried to counter this creative choice by pushing the exposure up several points during the printing process, creating a look very different from what was intended.

When Harris began the restoration process, as with *Star Wars*, the yellow color information in the negative had significantly faded. More than thirty years of handling and re-printing had caused much of the damage. Because of Willis' techniques of exposing the film with such low lighting, there was no picture information in the blacks. "They say, of Gordon Willis, that he ice skates on the emulsion, meaning he's just always there in the total danger zone, where it'll all fall apart -- his blacks are so black and the subtleties he works with as an artist are so difficult" (Emulsional Rescue, Coppola). Unlike most film stock, several stops of exposure latitude exist in the negative to allow adjustments during printing. Without any image in these dark areas, the emulsion was extremely thin and fragile.

High-resolution scans of the film elements allowed precise color timing adjustments to perfectly balance the at-times washed-out whites, inkiest of blacks, and sepia tone. "Until recently, it's been pretty impossible to really transfer a motion picture, such as *The Godfather*, which has incredible latitude between light and dark, to a VHS, or even a television screen... the electronic image is starting to improve to the point where you really, at home, can enjoy a film with the quality and the latitude and the photographic excellence that the original films may have had" (Emulsional Rescue, Coppola) [Fig. 4].

Modern Cinema / Digital (1990s-Today)

Film restoration and preservation became a more commonly understood part of the filmmaking business in the late 80s. Upgraded facilities and constant evaluation of materials led many studios to realize that restoration was needed on many of their most cherished properties. The rise of home video around this time also helped bring many classic films off the shelf to create video masters. While the major studios seemed to understand the problem, the solution was short-term. The limitations of television size, home video formats, broadcasting standards, and telecine equipment meant that video masters were created for current technology only.

The expense of this large-scale transfer to video was great, but the hidden cost of failing to futureproof assets meant these masters need to be constantly upgraded to contend with the new formats. For films that studios deem to have less commercial draw, the video masters created in the early 90s are still the only versions currently available. If their destination was a VHS release, these video masters were serviceable. The number of analog resolution scan lines created during the telecine process in the 80s and 90s matched the resolution of a videotape, which in turn matched the resolution of all commercial television sets.

The mid/late-90s saw a digital shift in many aspects of daily life. The millennium brought with it technological excitement; the future was perceived to be just around the corner. DVD helped herald in that future for home video when it arrived on the scene in 1996 with *Twister* (Jan de Bont). The upgrades most important to consumers were the inclusion of chapter markers so that large sections of the movie could be skipped without the time consuming need to fast forward, and a menu system that could be recalled at the push of a button which allowed viewers to navigate the various features of the disc including alternate audio tracks, subtitles, and bonus features.

The real technological advance came with DVD's doubling of picture resolution and the efficient digitization, encoding and storage of that information. While this upgrade seemed impressive at home, a DVD's resolution of 720 horizontal and 480 vertical lines of resolution is dwarfed by the available resolution in a film print, not to mention a sharper original negative. Estimates by imaging scientists place the usable resolution of a modern negative film stock at somewhere between 8,000 and 12,000 lines of horizontal resolution, meaning we are watching something like only a tenth of the picture information originally recorded by the camera when we watch a movie on DVD at home.

High definition and the Blu-Ray home video format have shrunk this gap, allowing for closer to 20-25% of the picture information to be brought home, on par with most average quality prints screened at your local multiplex ten years ago. The current

trend toward 4K pushes the resolution once again to 4,000 lines of horizontal resolution, effectively half the information stored in the negative, and identical to digital theatrical prints. While this may still be only a portion of what is contained in the negative, this most recent doubling has brought about a new interest to rescan films held in studio vaults and in archives.

The 4K workflow is now an industry standard for cameras (acquisition), computer processing power and software to edit, color correct and finish (post production), and theatrical projectors (distribution). For films that have already been made, 4K has tremendous potential to bring audiences face to face with what the filmmaker's intended, free from technological limitations. 4K at home is around the corner, and already available to early adopters willing to shell out large amounts of money.

The generation of film that stands to benefit from, if not true restorations, then remastering in 4K, are those made in the decade or so before the shift to the digital pipeline around 2005. These films had video masters created around the time of their release on home video, when telecine technology was either still analog or standard definition digital. The resulting masters, like all other films released for home viewing around this time, were perfectly adequate. Today, many of these films are either too recent to warrant the cost of creating a new high definition telecine scan, or the films have too little critical acclaim or commercial potential to revisit. If demand arises for a Blu-Ray release of a title from this era, studios looking to save money will use an existing, dated, video master and apply tools that were designed for repairing and restoring film damage to instead sharpen, smooth and conceal the limitations of the master.

Universal Pictures is one of the major studios that consistently use these shortcuts. Films from the 1980s-2000s released under their banner on Blu-Ray suffer from egregious grain removal, artificial sharpening, oversaturation, frame wobble, and other symptoms of trying to pass an outdated master as acceptable. *Jurassic Park* (Steven Spielberg, 1993), the third highest-grossing film of the 1990s, has already been released

twice on Blu-Ray by Universal: once in 2011 and again in 2013. Its first iteration on the high-definition format showed signs of a dated telecine and poorly managed DVNR (Digital Video Noise Reduction), leaving the image with a softer appearance and less defined grain structure. The second release stemmed from a new 4K scan of good-quality elements that should have yielded an extremely detailed and finely resolved image. Universal's decision to create this new scan for a theatrical 3D conversion meant that again, what could have been a competent release is held back.

Depth modeling done by software for this conversion is unable to work properly when an image is layered in grain. The film's natural texture is thus wiped away by DVNR scrubbing tools. This blurry mess is the "upgraded" image Universal provided for *Jurassic Park's* second Blu-Ray release. The result of using dated masters or excess digital post-processing is a film that looks like video, despite the increased resolution of high-definition or the benefits of a 4K telecine. Other studios occasionally take this shortcut too, Warner Bros. almost exclusively uses masters created for standard-definition DVD released in the very early 2000s but other distributors are more proactive and respectful to their catalog.

On top of their financial means, which may vary significantly from archive to archive, depending on the commitment to preservation of the management, another advantage is their proximity to the film industry. Studios (similarly to broadcasters) combine film producing, rights holding and archiving in one body. While non-profit archives must actively fetch and collect the films that fall in their scope, often facing the mistrust of rights-holders, studio archives can in principle simply ask their colleagues from the production department to deliver the most original film elements once they are done with them (Fossati 178).

Independent companies also compete in the market, securing home video rights to films that are overlooked by the major studios or that are foreign and do not have a licensor in the U.S. The Criterion Collection has been operating under the following mission statement:

Since 1984, the Criterion Collection, a continuing series of important classic and contemporary films, has been dedicated to gathering the greatest films from around the world and publishing them in editions that offer the highest technical quality and award-winning, original supplements. Each film is presented uncut, in its original aspect ratio, as its maker intended it to be seen. Every time we start work on a film, we track down the best available film elements in the world, use state-of-the-art telecine equipment and a select few colorists capable of meeting our rigorous standards, then take time during the film-to-video digital transfer to create the most pristine possible image and sound. Whenever possible, we work with directors and cinematographers to ensure that the look of our releases does justice to their intentions. Our supplements enable viewers to appreciate Criterion films in context, through audio commentaries by filmmakers and scholars, restored director's cuts, deleted scenes, documentaries, shooting scripts, early shorts, and storyboards ("About Us").

Criterion, along with several companies in the U.S. and abroad with similar outlooks, including Kino International, Shout! Factory, Flicker Alley, Olive Films and Masters of Cinema, among others, has done the dirty work of picking up where the major studios have fallen short.

Hollywood studios have developed a mutually beneficial professional relationship with these boutique labels. Criterion and others have been able to license select titles from Universal, Paramount, 20th Century Fox, and Warner Bros for a fee. The major studios benefit when companies like Criterion take over the restoration effort and use their brand appeal and commitment to quality to help drive sales of titles that would otherwise not be given anything more than a lackluster edition. What might have been a film with a bleak future on home video can now enjoy a special edition release.

Together, small boutique labels and the large studios have created an environment that favors access. Films watched at home come closer than ever to matching the optimal theatrical experience. While some will lament the loss of the

theatrical *specialness* and the communal event, for others, the experience is too dependent on the behavior of the audience and sometimes underwhelming. Regardless of one's preference, the closing of the gap between these two movie-viewing spheres will benefit everyone.

There has never been a better time to be passionate about film. Our access to the vast catalogs of cinema's past is astounding. Though there is still much left to do to reverse the damages of time and make available all that is out there, it is no longer technology that stands in the way. Money is still what decides which films get released, when, and the amount of effort put into the presentation. The landscape of home video is still in flux, however, and video streaming services are beginning to change the way studios approach their catalog titles. What this means for consumers and cinephiles is yet to be seen. Until then, there remains an ever-increasing wealth of cinema available to watch. Let's get comfy.



Fig. 1 Intolerance (TOP: Image Entertainment 1999 vs. BOTTOM: Cohen Media 2013)



Fig. 2 The Red Shoes (TOP: Criterion 2003 vs. BOTTOM: Criterion 2010)



Fig. 3 *Elena and her Men* (TOP: Criterion 2004 vs. BOTTOM: Gaumont 2012)



Fig. 4 The Godfather Part II (TOP: 2007 Restoration vs. BOTTOM: Print from 1974 Dupe)



Fig. 5 Star Wars (TOP: “Unrestored Film” vs. BOTTOM: “Special Edition”)

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